MANAGING EMISSIONS
versus
EXPOSURE TO AMBIENT AIR CONCENTRATIONS

UNECE Air Convention (LRTAP)
6th Expert Panel on Clean Air in Cities (EPCAC)

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18th November 2025

Brief

1. *The remit and scope*
2. *Managing Exposure*
3. *Managing Emissions*
4. *The missing link*
5. *Conclusions and Recommendations*
6. *Questions and Answers*

The remit

Provide a science-policy arena for analysis of cost-effective multi-scale air quality strategies to improve air quality in cities and ultimately in regions

- Pollutants from cities **transported over long distances**. background air pollution
- **Coherence** between policy areas is essential: air quality, climate/energy actions, urban planning
- Local authorities are often main actor, but **collaboration across all level** of governments is essential for effective implementation

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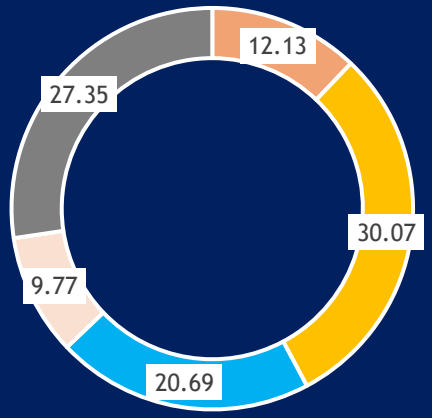
Managing exposure versus emissions

Total costs of years of life lost (€): 92,186K

Fine particulate matter (PM2.5) concentrations in Dublin, Ireland: spatial and sector-specific contributions and costs of premature deaths

value of a life-year (VOLY) at 111,470 € for 2021.



Source:
https://www.eea.europa.eu/en/topics/in-depth/air-pollution/fine-particulate-matter-pm2-5-concentrations-in-european-cities
-spatial-and-sector-specific-contributions-and-costs-of-premature-deaths-1

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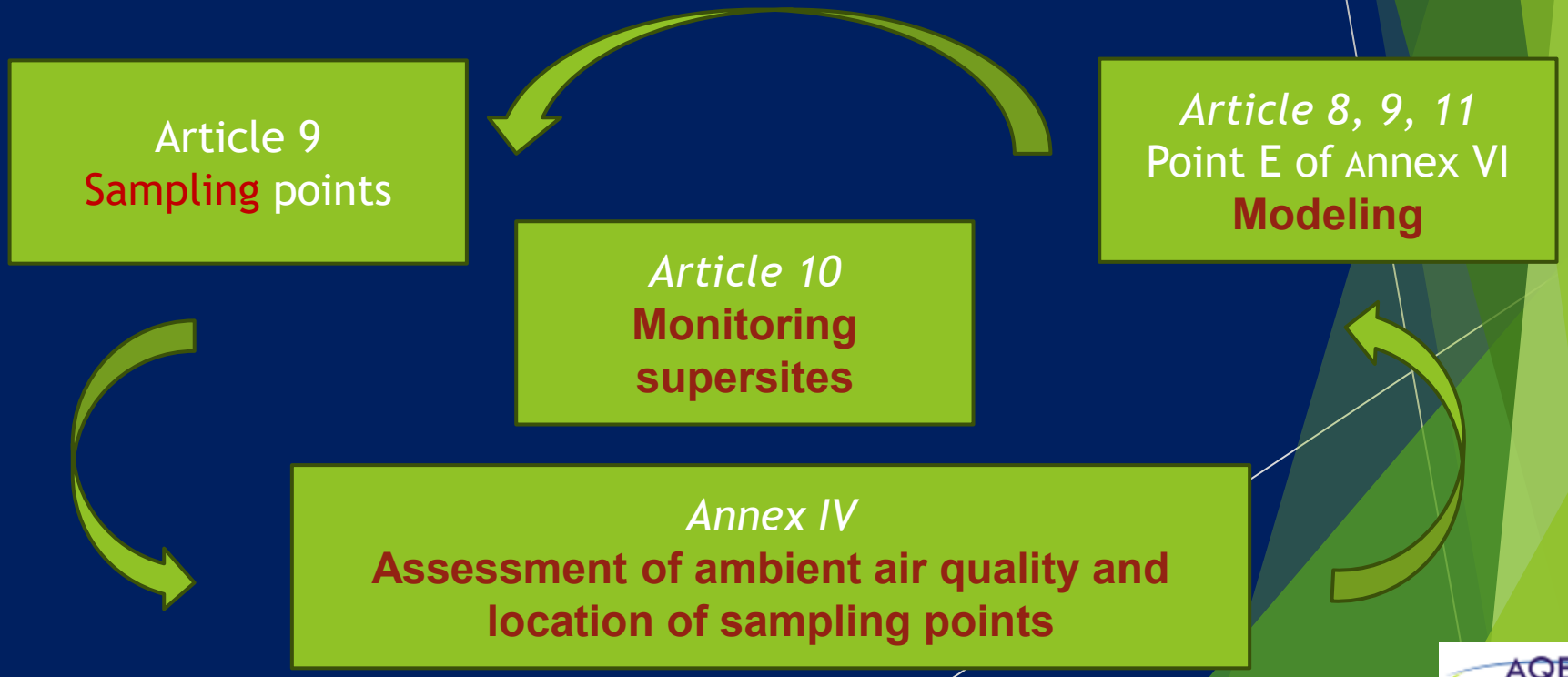
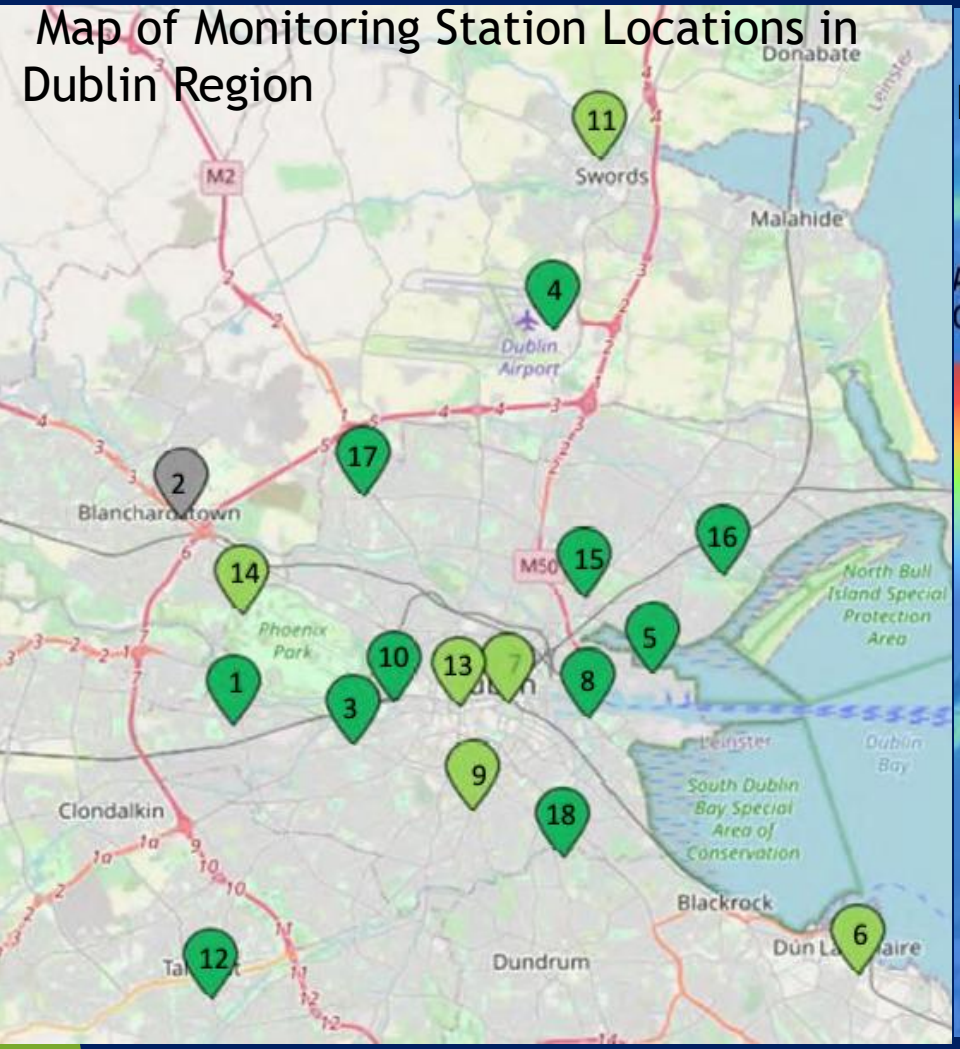
Managing exposure: EU Directive 2024/2881, Monitoring, Modelling

classification of the territory of each Member State into zones (and agglomerations) reflecting population density and average exposure territorial units

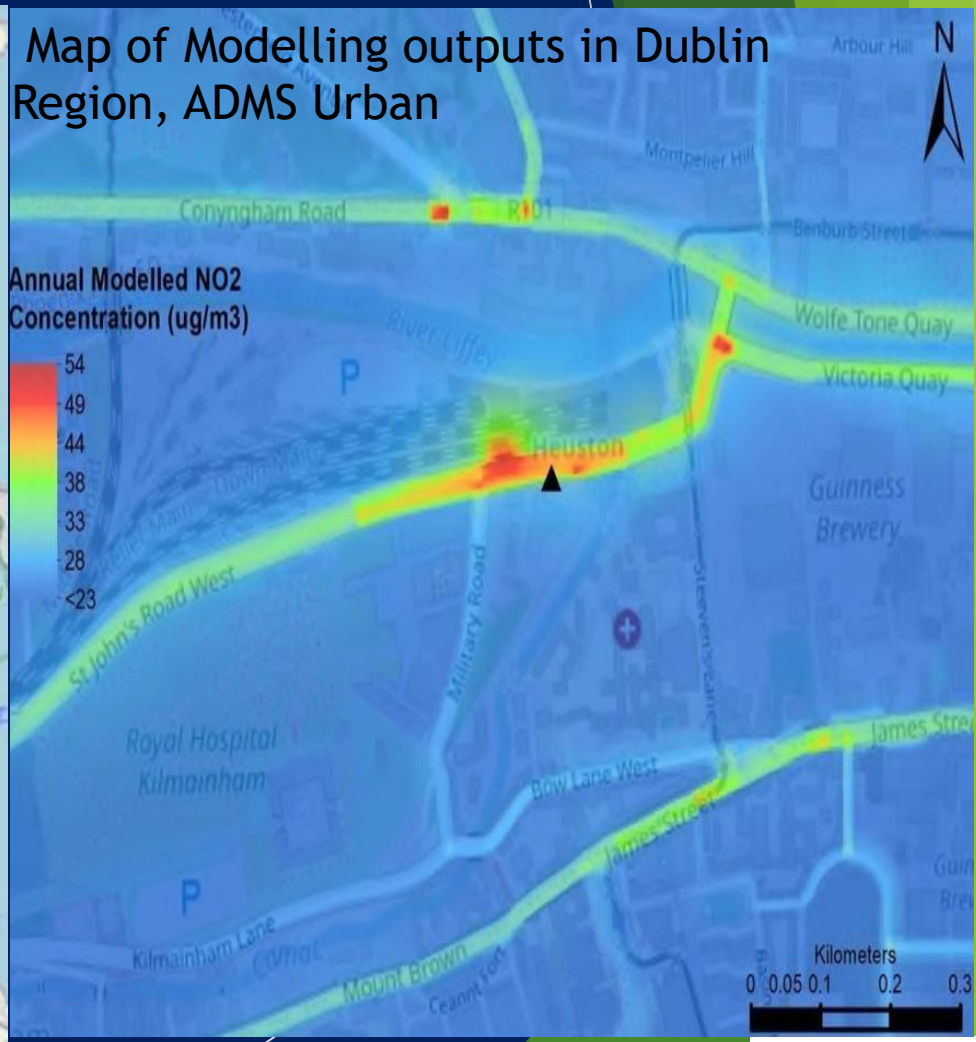


Managing exposure: EU Directive 2024/2881, Monitoring, Modelling

Map of Monitoring Station Locations in Dublin Region



Map of Modelling outputs in Dublin Region, ADMS Urban



Managing emissions: EU Directive 2024/2881, opening provisions

(37) Air quality plans should be developed and updated for zones or average exposure territorial units within which concentrations of pollutants in ambient air exceed the relevant air quality limit values, target values or average exposure reduction obligations

Article 4 Definitions

Articles 19, 20: Air quality plans

(41) 'air quality plan' means a plan that sets out policies and measures in order to comply with limit values, target values or average exposure reduction obligations once these have been exceeded;

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Managing emissions: EU Directive 2024/2881, Article 19, Article 20: Air quality plans

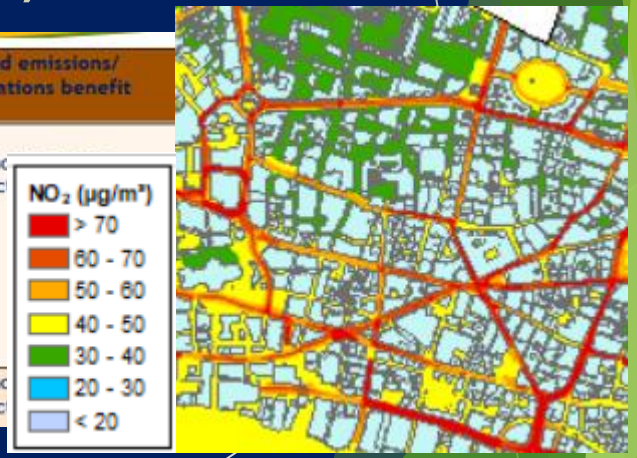
1. Where, in given zones, the levels of pollutants in ambient air **exceed** any limit value or target value laid down in Section 1 of Annex I, MS shall establish **air quality plans** for those zones that set out **appropriate measures** to achieve the limit value or target value concerned and to keep the exceedance period as short as possible …

Managing emissions: EU Directive 2024/2881, Annex VIII,

(a) listing and description of all the measures considered in the air quality plan,

(b) quantification or estimation of emission reduction (in tonnes/year) and, where available, concentration reductions of each measure referred to in point (a).

Action category	Action ID	Action name and description	Responsibility	Cost	Expected emissions/ concentrations benefit
Reducing emissions from new developments	EBD1	Require an air quality zero emissions approach for all development in or affecting **Sensitive Densely Populated Areas**, using Damage Cost Approach over the life cycle of the scheme for total pollutant emissions (NOx and $PM_{2.5}$) to determine the level of mitigation required.	Planning Specialist Team	None	Significant emissions/conc benefits expec
	EBD2	Ensure all planning applications are as a minimum	Planning Specialist Team	None	Emissions/conc benefits expec



AIR QUALITY ACTION PLAN

EMISSION REDUCTION MEASURES

Action category	Action ID	Action name and description	Responsibility	Cost	Expected emissions/ concentrations benefit	Timescale for implementation	Outputs, Targets and KPIs
Reducing emissions from new developments	EBD1	Require an air quality zero emissions approach for all development in or affecting **Sensitive Densely Populated Areas**, using Damage Cost Approach over the life cycle of the scheme for total pollutant emissions (NOx and $PM_{2.5}$) to determine the level of mitigation required.	Planning Specialist Team	None	Significant emissions/concentrations benefits expected	Ongoing	Percentage/number of planning applications with total emissions mitigated
	EBD2	Ensure all planning applications are as a minimum air quality neutral, with no exceptions for development that affect **Sensitive Densely Populated Areas**. Application of more stringent mitigation requirements in development that affects the Sensitive Densely Populated Areas	Planning Specialist Team	None	Emissions/concentrations benefits expected	Ongoing	Percentage/number of planning applications with air quality neutral calculations undertaken
	EBD3	Requiring an option appraisal for development that may not necessarily require an EIA, but due to its location and or level of annual pollutant emissions, will be required by this AQAP to undergo an options appraisal exercise. This will apply to data centres, and major development that present significant annual NO_2 and $PM_{2.5}$ total annual emissions.	Planning Specialist Team	None	Significant Emissions/concentrations benefits expected	2024 onwards	Number of planning applications that required an option appraisal outside an EIA assessment/requirement

AIR QUALITY ACTION PLAN

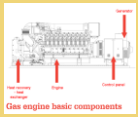
EXPOSURE REDUCTION MEASURES

Action category	Action ID	Action name and description	Responsibility	Cost	Expected emissions/ concentrations benefit	Timescale for implementation	Outputs, Targets and KPIs
Protecting the vulnerable	PTV1	Supporting Airtext alert system	Public Health	Low	No emissions/concentrations benefits expected but reduction of exposure to pollution levels expected.	Ongoing	Number of citizens/Institutions subscribed
	PTV2	Promoting the air pollution forecasts	Public Health	Low	No emissions/concentrations benefits expected but reduction to exposure to pollution levels expected.	Ongoing	Number of citizens/Institutions subscribed
	PTV3	Reducing pollution/pollutant emissions in and around schools	Transport Team	Medium	Emissions/concentrations benefits expected as well as reduced exposure to poor air quality by schoolchildren	Ongoing	Number of schools where emission reductions have been achieved
	PTV4	Prioritizing schools in poor air quality areas for deployment of green walls / pollution barriers	Planning Team/Landscaping	Low	Reduced exposure to poor air quality by schoolchildren	2024-	Number of green walls / pollution barriers deployed
	PTV5	Prioritizing anti-idling initiatives near schools, hospitals, care homes, and sensitive residential areas of poor air quality	Transport Team	None	Emissions/concentrations benefits expected Reduced exposure to poor air quality by sensitive and vulnerable groups of the population	Ongoing	Number of anti-idling initiatives near sensitive receptors

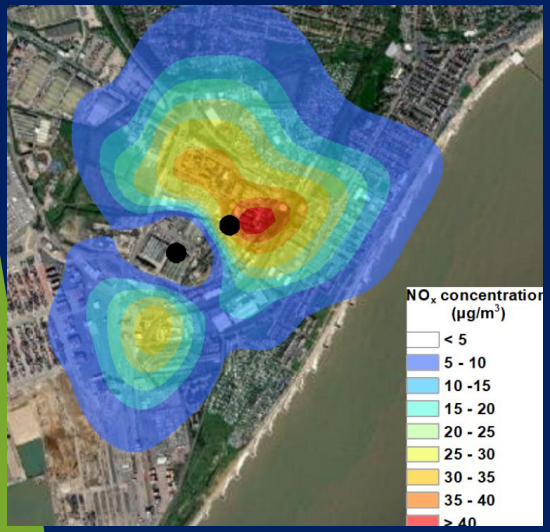
Managing Emissions versus Exposure: the missing link: significance of impacts criteria

PLANNING APPLICATION TO A Local Planning Authority (LPA)

EXPOSURE REDUCTION MANAGEMENT



DEV. DESIGN 200 UNITS



Magnitude of Change Descriptors Matrix

Long term average concentration at receptor in assessment year	% change in concentration relative to AQAL			
	1	2 – 5	6 – 10	> 10
75% or less of AQAL	Negligible	Negligible	Low	Medium
76 – 94 % of AQAL	Negligible	Low	Medium	Medium
95 – 102 % of AQAL	Low	Medium	Medium	High
103 – 109 % of AQAL	Medium	Medium	High	High
110% or more of AQAL	Medium	High	High	High

Significance of Effect Matrix

Sensitivity / Value of Receptor	Magnitude of Impact			
	High	*Medium*	*Low*	*Negligible*
High	Major	Major / Moderate	Moderate	Negligible
Medium	Major / Moderate	Moderate	Moderate / Minor	Negligible
Low	Moderate	Moderate / Minor	Minor	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

NO MITIGATION IS REQUIRED

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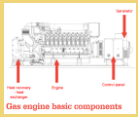
Managing Emissions versus Exposure: the missing link: significance of impacts criteria

PLANNING APPLICATION TO A
Local Planning Authority (LPA)

EMISSIONS MANAGEMENT



DEV. DESIGN 200 UNITS

GEN SETS OPERATION SCHEDULE					NON ABATED (h)	NON ABATED (expl).	ABATED (h)	ABATED (expl.)
Generator Testing Schedule	*Load Profile*	*Individual Test Duration (min)*	*Frequency*	*Total time (hours)*				
Weekly testing	10%	10	50	8.333333333	8.333333333	minutes each week so not abat	0	0
Monthly testing	75%	30	11	5.5	1.833333333	(first 20 min of each hour))	3.666666667	second 40 minutes of each hour
Yearly testing	100%	60	1	1	0.333333333	(first 20 min of each hour))	0.666666667	second 40 minutes of each hour
Generator Maintenance Schedule							0	
Maintenance (minor)	50%	15	3	0.75	0.25	(first 20 min of each hour))	0.5	second 40 minutes of each hour
Maintenance (major)	50%	30	3	1.5	0.5	(first 20 min of each hour))	1	second 40 minutes of each hour
							0	
Emergency Backup							0	
Estimated emergency operation (initial period – maximum load)	100%	20	1	0.333333333	0.111111111	(first 20 min of each hour))	0.222222222	second 40 minutes of each hour
Estimated emergency operation (subsequent stable operation)	100%	100	1	1.666666667	0.555555556	(first 20 min of each hour))	1.111111111	second 40 minutes of each hour
TOTAL OPERATION TIME				**19.1**	**11.9**		**7.2**	

Loading %	NOx (g/s) RAW	NOx (g/s) SCR	PM2.5 (g/s)
100%	4.425	0.486	0.033
75%	3.770	0.414	0.025
50%	2.560	0.281	0.017
25%	1.560	0.171	0.008
10%	0.440	0.440	0.003

SCR effciency
89.018

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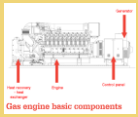
Managing Emissions versus Exposure: the missing link: significance of impacts criteria

PLANNING APPLICATION TO A Local Planning Authority (LPA)

67, 000 AADT

EMISSIONS MANAGEMENT

https://www.gov.uk/government/publications/assess-the-impact-of-air-quality



DEV. DESIGN 200 UNITS

NOx Part A Category 3

Year	2025	2026	2027	2028	2029	2030	2
Reduction in emissions (tonnes)	14.281511	14.281511	14.281511	14.281511	14.281511	14.281511	14.2
Central Damage Costs (£)	8766	8766	8766	8766	8766	8766	
Central Benefit (£)	125193	125193	125193	125193	125193	125193	1
Discounted Central Benefit (£)	125193	123343	121520	119724	117955	116212	1
Central Present Value	**£3,051,720**						
Low Sensitivity Damage Costs (£)	1658	1658	1658	1658	1658	1658	
Low Sensitivity Benefit (£)	23681	23681	23681	23681	23681	23681	
Discounted Low Sensitivity Benefit (£)	23681	23331	22986	22646	22312	21982	
Low Sensitivity Present Value	**£577,249**						
High Sensitivity Damage Costs (£)	32720	32720	32720	32720	32720	32720	
High Sensitivity Benefit (£)	467288	467288	467288	467288	467288	467288	4
Discounted High Sensitivity Benefit (£)	467288	460382	453579	446876	440271	433765	4
High Sensitivity Present Value	**£11,390,649**						

PM2.5 Part A Category 3

Year	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Reduction in emissions (tonnes	0.216810	0.216810	0.216810	0.216810	0.216810	0.216810	0.216810	0.216810	0.216810	0.216810	0.216810
Central Damage Costs (£)	160992	160992	160992	160992	160992	160992	160992	160992	160992	160992	160992
Central Benefit (£)	34905	34905	34905	34905	34905	34905	34905	34905	34905	34905	34905
Discounted Central Benefit (£)	34905	34389	33881	33380	32887	32401	31922	31450	30985	30527	30076
Central Present Value	**£850,837**										
Low Sensitivity Damage Costs (£)	63572	63572	63572	63572	63572	63572	63572	63572	63572	63572	63572
Low Sensitivity Benefit (£)	13783	13783	13783	13783	13783	13783	13783	13783	13783	13783	13783
Discounted Low Sensitivity Benefit (£)	13783	13579	13379	13181	12986	12794	12605	12419	12235	12055	11876
Low Sensitivity Present Value	**£335,978**										
High Sensitivity Damage Costs (£)	439683	439683	439683	439683	439683	439683	439683	439683	439683	439683	439683
High Sensitivity Benefit (£)	95328	95328	95328	95328	95328	95328	95328	95328	95328	95328	95328
Discounted High Sensitivity Benefit (£	95328	93919	92531	91164	89816	88489	87181	85893	84624	83373	82141
High Sensitivity Present Value	**£2,323,716**										

Pollutant	Low Sensitivity Present Value	Central Present Value	High Sensitivity Present Value
NOx Part A Category 3	£577,249	£3,051,720	£11,390,649
PM2.5 Part A Category 3	£335,978	£850,837	£2,323,716
Total DAMAGE COST		£3,902,557	

MITIGATION IS REQUIRED

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Managing Emissions versus Exposure: Conclusions

1) Exposure based assessments classify impacts on air quality as negligible concluding that mitigation is not required, even when significant emissions are released - poor significance guidance not aligned with WHO guidelines

2) Total Emissions should be used to dictate the level of impact of development, not process contributions

3) This will enable the off-setting of emissions and internalization of cost of pollution

Managing Emissions versus Exposure: Conclusions

4) The ascertainment of emission level of pollutants into the atmosphere in tonnes/year of pollutant released provides leverage for negotiation of appropriate mitigation strategies and safeguard the efforts of Local Action Plans

5) When the total mitigation level required is ascertained using emissions, quantifiable measures can be deducted from total level of mitigation due

Managing Emissions versus Exposure: Recommendations

RECCOMENDATION 1

Guidelines should be developed to guide the determination of significance of impacts of exposure levels based on WHO guidelines

RECCOMENDATION 2

Guidelines should be developed on how to determine the significance of emission levels; zero emission benchmarks should apply in sensitive areas, i.e. total emissions should be mitigated or off-set

Thank you for your attention

Questions and Answers